

Patent Claims

1. Use of glass compositions with an antimicrobial and/or disinfecting effect in materials for restoring teeth, excluding implants, wherein the glass composition is made up of the following components (in wt. % based on oxide):

| | |
|--------------------------------|----------------|
| SiO ₂ | 0 – 99.5 wt. % |
| P ₂ O ₅ | 0 – 80 wt. % |
| SO ₃ | 0 – 40 wt. % |
| B ₂ O ₃ | 0 – 80 wt. % |
| Al ₂ O ₃ | 0 – 30 wt. % |
| Li ₂ O | 0 – 30 wt. % |
| Na ₂ O | 0 – 40 wt. % |
| K ₂ O | 0 – 30 wt. % |
| CaO | 0 – 25 wt. % |
| MgO | 0 – 15 wt. % |
| SrO | 0 – 30 wt. % |
| BaO | 0 – 40 wt. % |
| ZnO | 0 – < 15 wt. % |
| TiO ₂ | 0 – 10 wt. % |
| ZrO ₂ | 0 – 15 wt. % |
| CeO ₂ | 0 – 10 wt. % |
| Ag ₂ O | 0 – 5 wt. % |
| F | 0 – 70 wt. % |
| J | 0 – 10 wt. % |
| Fe ₂ O ₃ | 0 – 5 wt. % |

and, if applicable, trace elements and/or conventional refining substances in established quantities, wherein the sum of SiO₂ + P₂O₅ + SO₃ + B₂O₃ + Al₂O₃ is greater than 20 wt. % and a maximum of 99.5 wt. % and the sum of ZnO + Ag₂O + CuO + GeO₂ + TeO₂ + Cr₂O₃ is > 0.01 wt. %.

2. Use of glass compositions with an antimicrobial and/or disinfecting effect in materials for restoring teeth, excluding implants, wherein the glass composition is made up of the following components (in wt. % based on oxide):

| | |
|-------------------------|----------------|
| SiO_2 | 0 – 80 wt. % |
| P_2O_5 | 0 – 80 wt. % |
| SO_3 | 0 – 40 wt. % |
| B_2O_3 | 0 – 80 wt. % |
| Al_2O_3 | 0 – 30 wt. % |
| Li_2O | 0 – 30 wt. % |
| Na_2O | 0 – 40 wt. % |
| K_2O | 0 – 30 wt. % |
| CaO | 0 – 25 wt. % |
| MgO | 0 – 15 wt. % |
| SrO | 0 – 30 wt. % |
| BaO | 0 – 40 wt. % |
| ZnO | 0 – < 15 wt. % |
| Ag_2O | 0 – 5 wt. % |
| F | 0 – 65 wt. % |
| J | 0 – 10 wt. % |
| Fe_2O_3 | 0 – 5 wt. % |
| Ag_2O | 0 – 5 wt. % |

and, if applicable, trace elements and/or conventional refining substances in established quantities, wherein the sum of $\text{SiO}_2 + \text{P}_2\text{O}_5 + \text{SO}_3 + \text{Al}_2\text{O}_3$ is greater than 20 wt. % and a maximum of 80 wt. %.

3. Use of glass compositions with an antimicrobial and/or disinfecting effect in materials for restoring teeth, excluding implants, wherein the glass composition is made up of the following components (in wt. % based on oxide):

| | |
|----------------|----------------|
| SiO_2 | 0 – 99.5 wt. % |
|----------------|----------------|

| | |
|--------------------------------|----------------|
| P ₂ O ₅ | 0 – 80 wt. % |
| SO ₃ | 0 – 40 wt. % |
| B ₂ O ₃ | 0 – 80 wt. % |
| Al ₂ O ₃ | 0 – 30 wt. % |
| Li ₂ O | 0 – 30 wt. % |
| Na ₂ O | 0 – 40 wt. % |
| K ₂ O | 0 – 30 wt. % |
| CaO | 0 – 25 wt. % |
| MgO | 0 – 15 wt. % |
| SrO | 0 – 30 wt. % |
| BaO | 0 – 40 wt. % |
| ZnO | 0 – < 15 wt. % |
| Ag ₂ O | 0 – 5 wt. % |
| F | 0 – 65 wt. % |
| J | 0 – 10 wt. % |
| Fe ₂ O ₃ | 0 – 5 wt. % |
| Ag ₂ O | 0.01 – 5 wt. % |

and, if applicable, trace elements and/or conventional refining substances in established quantities, wherein the sum of SiO₂ + P₂O₅ + SO₃ + B₂O₃ + Al₂O₃ is > 20 wt. % and a maximum of 99.5 wt. %.

4. Use in accordance with one of claims 1 through 3 in the field of tooth fillers.
5. Use in accordance with one of claims 1 through 4, wherein the tooth filler is a material selected from the following group:
 - a composite material
 - a glasionomer
 - a compomer.
6. Use in accordance with one of claims 1 through 5 in coating, filling or screening materials for ceramic dental suprastructures.

7. Use in accordance with one of claims 1 through 6,
characterized in that
the glass composition ZnO lies in the range of 0.25 to < 15 wt. %, preferably 2.5 to 10 wt. %.
8. Use in accordance with one of claims 1 through 7,
characterized in that
the glass composition Ag₂O lies in the range of 0.01 through 5 wt. %, preferably 0.05 to 2 wt. %, and even more preferably 0.5 to 2 wt. %.
9. Use in accordance with one of claims 1 through 8,
characterized in that
the sum BaO + SrO is greater than 10 wt. %.
10. Ion-releasing glass composition with an antimicrobial effect for use as materials for restoring teeth, in particular in materials for filling teeth, in combination with materials for filling teeth, in particular selected from glasionomers, composites, compomers, wherein the glass composition is made up of the following components (in wt. % based on oxide):

| | |
|--------------------------------|------------------|
| P ₂ O ₅ | > 66 – 80 wt. % |
| SO ₃ | 0 – 40 wt. % |
| B ₂ O ₃ | 0 – 1 wt. % |
| Al ₂ O ₃ | > 6.2 – 10 wt. % |
| SiO ₂ | 0 – 10 wt. % |
| Li ₂ O | 0 – 25 wt. % |
| Na ₂ O | > 9 – 20 wt. % |
| CaO | 0 – 25 wt. % |
| MgO | 0 – 15 wt. % |
| SrO | 0 – 30 wt. % |

| | |
|--------------------------------|----------------|
| BaO | 0 – 15 wt. % |
| ZnO | 0 – < 15 wt. % |
| Ag ₂ O | 0 – 5 wt. % |
| CuO | 0 – 10 wt. % |
| GeO ₂ | 0 – 10 wt. % |
| TeO ₂ | 0 – 15 wt. % |
| Cr ₂ O ₃ | 0 -10 wt. % |
| J | 0 – 10 wt. % |
| F | 0 – 3 wt. % |

wherein the sum of ZnO + Ag₂O + CuO + GeO₂ + TeO₂ + Cr₂O₃ + J > 0.01 wt. %.

11. Ion-releasing glass composition with an antimicrobial effect for use as materials for restoring teeth, in particular in materials for filling teeth, in combination with materials for filling teeth, in particular selected from glasionomers, composites, compomers, wherein the glass composition is made up of the following components (in wt. % based on oxide):

| | |
|--------------------------------|-----------------|
| P ₂ O ₅ | > 66 – 80 wt. % |
| SO ₃ | 0 – 40 wt. % |
| B ₂ O ₃ | 0 – 1 wt. % |
| Al ₂ O ₃ | 0 – 3.9 wt. % |
| SiO ₂ | 0 – 10 wt. % |
| CaO | 0 – 25 wt. % |
| MgO | 0 – 15 wt. % |
| SrO | 0 – 30 wt. % |
| BaO | 0 – 15 wt. % |
| ZnO | 0 – < 15 wt. % |
| Ag ₂ O | 0 – 5 wt. % |
| CuO | 0 – 10 wt. % |

| | |
|--------------------------------|--------------|
| GeO ₂ | 0 – 10 wt. % |
| TeO ₂ | 0 – 15 wt. % |
| Cr ₂ O ₃ | 0 – 10 wt. % |
| J | 0 – 10 wt. % |
| F | 0 – 3 wt. % |

wherein the sum of ZnO + Ag₂O + CuO + GeO₂ + TeO₂ + Cr₂O₃ + J > 1 wt. %.

12. Ion-releasing glass composition with an antimicrobial effect for use as materials for restoring teeth, in particular in materials for filling teeth, in combination with materials for filling teeth, in particular selected from glasionomers, composites, compomers, wherein the glass composition is made up of the following components (in wt. % based on oxide):

| | |
|--------------------------------|-----------------|
| P ₂ O ₅ | > 45 – 90 wt. % |
| B ₂ O ₃ | 0 – 60 wt. % |
| SiO ₂ | 0 – 40 wt. % |
| Al ₂ O ₃ | 0 – 20 wt. % |
| SO ₃ | 0 – 30 wt. % |
| Li ₂ O | 0 – 0.1 wt. % |
| Na ₂ O | 0 – 0.1 wt. % |
| K ₂ O | 0 – 0.1 wt. % |
| CaO | 0 – 40 wt. % |
| MgO | 0 – 40 wt. % |
| SrO | 0 – 15 wt. % |
| BaO | 0 – 40 wt. % |
| ZnO | 0 – < 15 wt. % |
| Ag ₂ O | 0 – 5 wt. % |
| CuO | 0 – 10 wt. % |
| Cr ₂ O ₃ | 0 – 10 wt. % |

| | |
|--------------------------------|--------------|
| J | 0 – 10 wt. % |
| TeO ₂ | 0 – 10 wt. % |
| GeO ₂ | 0 – 10 wt. % |
| TiO ₂ | 0 – 10 wt. % |
| ZrO ₂ | 0 – 10 wt. % |
| La ₂ O ₃ | 0 – 10 wt. % |
| Nb ₂ O ₃ | 0 – 5 wt. % |
| CeO ₂ | 0 – 5 wt. % |
| Fe ₂ O ₃ | 0 – 5 wt. % |
| WO ₃ | 0 – 5 wt. % |
| Bi ₂ O ₃ | 0 – 5 wt. % |
| MoO ₃ | 0 – 5 wt. % |

wherein the sum of ZnO + Ag₂O + CuO + GeO₂ + TeO₂ + Cr₂O₃ + J > 0.001 wt. %.

13. Ion-releasing glass composition with an antimicrobial effect for use as materials for restoring teeth, in particular in materials for filling teeth, in combination with materials for filling teeth, in particular selected from glasionomers, composites, compomers, wherein the glass composition is made up of the following components (in wt. % based on oxide):

| | |
|--------------------------------|---------------|
| SiO ₂ | 40 – 80 wt. % |
| B ₂ O ₃ | 5 – 40 wt. % |
| Al ₂ O ₃ | 0 – 10 wt. % |
| P ₂ O ₅ | 0 – 30 wt. % |
| Li ₂ O | 0 – 25 wt. % |
| Na ₂ O | 0 – 25 wt. % |
| K ₂ O | 0 – 25 wt. % |
| CaO | 0 – 25 wt. % |
| MgO | 0 – 15 wt. % |

| | |
|--------------------------------|----------------|
| SrO | 0 – 15 wt. % |
| BaO | 0 – 15 wt. % |
| ZnO | 0 - < 15 wt. % |
| Ag ₂ O | 0 – 5 wt. % |
| CuO | 0 – 10 wt. % |
| GeO ₂ | 0 – 10 wt. % |
| TeO ₂ | 0 – 15 wt. % |
| Cr ₂ O ₃ | 0 – 10 wt. % |
| J | 0 – 10 wt. % |
| F | 0 – 10 wt. % |

wherein the sum of ZnO + Ag₂O + CuO + GeO₂ + TeO₂ + Cr₂O₃ + J between 5 and 70 wt. %.

14. Glass composition in accordance with one of claims 10 through 13, characterized in that the glass composition ZnO is in the range of 0.25 through < 15 wt. %, preferably 2.5 through 10 wt. %.
15. Glass composition in accordance with one of claims 10 through 14, characterized in that the glass composition Ag₂O is in the range of 0.01 through 5 wt. %, preferably 0.05 through 2 wt. %, even more preferably 0.5 through 2 wt. %.
16. Glass composition in accordance with one of claims 10 through 15, characterized in that the glass composition contains BaO and SrO and the sum of BaO + SrO is greater than 10 wt. %.
17. Ion-releasing glass composition in accordance with claims 10 through 16, characterized in that

there are at least two glass phases in the glass composition.

18. Ion-releasing glass composition in accordance with claim 17,
characterized in that
at least two glass phases have different compositions in the glass compositions.
19. Ion-releasing glass composition in accordance with one of claims 17 or 18,
characterized in that
the glass composition is a borosilicate glass composition.
20. Ion-releasing glass composition with an antimicrobial effect for use as materials for
restoring teeth, in particular in materials for filling teeth, in combination with materials
for filling teeth, in particular selected from glasionomers, composites, compomers,
wherein the output glass of the glass ceramic comprises the following components (in
wt. % based on oxide):

| | |
|------------------------|---------------|
| SiO_2 | 20 – 90 wt. % |
| CaO | 0 – 45 wt. % |
| Na_2O | 0 – 40 wt. % |
| P_2O_5 | 0 – 15 wt. % |
| Ag_2O | 0 – 5 wt. % |
| ZnO | 0 – 20 wt. % |

wherein the sum of $\text{ZnO} + \text{Ag}_2\text{O} + \text{CuO} + \text{GeO}_2 + \text{TeO}_2 + \text{Cr}_2\text{O}_3 + \text{J}$ is greater than 0.001
wt. %.

21. Ion-releasing glass ceramic in accordance with claim 20,
characterized in that

the crystalline main phases comprise alkali-earth alkali silicate and/or alkali silicate and/or earth alkali silicate, excluding a glass ceramic with the individual crystalline main phase $1\text{ Na}_2\text{O} \cdot 2\text{ CaO} \cdot 3\text{ SiO}_2$ and the main phase $\text{Na}_4\text{Ca}_3\text{Si}_6\text{O}_{16}(\text{OH}_2)$.

22. Procedure for the production of an ion-releasing glass composition in accordance with one of claims 17 through 19, characterized in that the at least two phases will be obtained through tempering in a temperature range $\text{Tg} \leq \text{T} \leq \text{Tg} + 300^\circ \text{C}$, wherein Tg is the transformation temperature of the glass.
23. Procedure for producing an ion-releasing glass ceramic in accordance with one of claims 20 through 21, characterized in that the output glass for the glass ceramic is milled and then a ceramitization of the powder-forming output glass takes place.
24. Procedure for producing an ion-releasing glass ceramic in accordance with one of claims 20 or 21, characterized in that the output glass for the glass ceramic is first ceramitized and then milled.
25. Glasionomer cement for dental applications, comprising:
a polymer, which contains free carboxylic-acid groups,
an ion-releasing, glasionomer glass composition
as well as an ion-releasing, antimicrobial glass composition or an ion-releasing, antimicrobial glass ceramic in accordance with one of claims 10 through 21.

26. Glasionomer cement in accordance with claim 25,
characterized in that
1 – 90 wt. % of the
glass composition is an ion-releasing glass/glass-ceramic composition, wherein the ion-releasing glass composition is an ion-releasing, antimicrobial glass composition or an ion-releasing glass ceramic or a mixture of an ion-releasing glasionomer composition with an ion-releasing, antimicrobial glass composition or an ion-releasing glass ceramic.
27. Glasionomer cement in accordance with one of claims 25 or 26,
characterized in that
the Ag_2O content is > 0.01 wt. %.
28. Glasionomer cement in accordance with one of claims 25 through 27,
characterized in that
the ratio of antimicrobial glass composition/glasionomer cement and/or tooth filler is
> 0.001.
29. Glasionomer cement in accordance with one of claims 25 through 28,
characterized in that
the ratio of antimicrobial glass composition/glasionomer cement and/or tooth filler is
< 200, preferably less than 100, and even more preferably less than 10.
30. Coating or screening material for ceramic dental suprastructures, comprising

a base material, preferably a tooth filler, in particular selected from:
a composite material,
a glasionomer cement,
a compomer,
an ion-releasing, antimicrobial glass composition or an ion-releasing glass ceramic in
accordance with one of claims 10 through 21.